Geological Climates

IT was with great surprise I read Prof. Haughton's unqualified statement in last week's NATURE, that—"It is *impossible* to suggest any rearrangement of land and water which shall sensibly *raise the temperature of the West of Europe*,"—since I had, as I thought, in my recently-published volume—"Island Life"—not only "suggested" such a rearrangement, but also adduced much evidence to show that it had actually occurred throughout the periods when both the West of Europe and the Arctic regions enjoyed a much higher temperature than they do now. I will now briefly re-state my "suggestion," and will also make a few remarks on the general causes of difference of temperature, which may serve to render the subject more intelligible.

It is now well known that places in the temperate zones owe their temperature at different seasons only partially to the amount of direct sun-heat they receive, but very largely to the amounts of heat brought to them by currents of air. Thus we explain, not only the mild winter climate of our islands as due to the prevalence of westerly and south-westerly winds which have become warmed by passing over the Atlantic, but also the wonderful inequality of temperature at different seasons of the year. When we have warm spring-like days in mid-winter, it is because these warm currents of air are passing steadily over our islands; while continued hard frosts are as clearly due to masses of cold air from the north or north-east which drift down to us, often with no perceptible wind. Again, when in April and May we have days as cold as those of December and January, they can always be traced to northerly or easterly currents of air, and are probably often connected with the southern drift of the icebergs at that season. It is clear then, that if south-westerly winds were to continue throughout the winter, the severity of that season would be entirely abolished; and the same effect would be produced if by any means the winds from the north and east lost their severity.

Now the source of the constant warmth of our westerly winds is admitted to be the influx of warm water into the North Atlantic—chiefly by the Gulf Stream; and this warm northward flow of tropical water, being primarily due to the trade-winds, is not confined to the Atlantic, but is equally present in the other great oceans, and similar effects are produced in them, though nowhere to so great a degree as in our islands, owing to our insular position and the great extent to which Europe to the east of us is permeated by water as compared with North America or Asia. The North Pacific, with its great Japan current, is probably quite as warm as the North Atlantic; but Vancouver's Island, though further south than London, has not so mild a climate; and this can be clearly traced to the great mass of land to the east and north of it, the lofty snow-clad mountains, and the absence of those deep gulfs and inland seas which do so much to ameliorate the climate of Europe.

Prof. Haughton states, in his "Lectures on Physical Geography," that the Kuro Siwo, or great Pacific current, is two and a half times as large as the Gulf Stream, while the Mozambique current, which forms the outflow of the warm waters of the Indian Ocean, is one and a half times as much, so that these two currents have together four times the bulk and heating power of the Gulf Stream. If therefore these two currents at any time obtained an entrance into the Arctic Ocean, it is difficult to over-estimate their effect on its climate. The Gulf Stream, of which probably not half passes northwards of our islands, gives to Iceland the same winter temperature as Philadelphia, and keeps the North Cape (far within the Arctic circle) permanently free from ice, and this, notwithstanding the powerful counteracting influences of the lofty Scandinavian mountains on the one side, and the huge ice-clad plateau of Greenland on the other. Suppose that only an equal proportion of the Kuro Siwo entered the Arctic Ocean, is it not probable that no sea-ice at all would form there? While, if Greenland were less elevated and thus ceased to be an accumulator of ice, the combined effect might be to render the whole Polar area free of icebergs. This would at once do away with the chief source of winter cold to all north temperate lands, and ameliorate the climate of America as much, proportionately, as that of Europe.

But we have yet to consider a still more powerful agent in ameliorating the climate of Western Europe in Secondary and early Tertiary times. The heated waters of the Indian Ocean have now no northern outlet, and only penetrate the continent in the sub-tropical Red Sea and Persian Gulf. Now if we suppose the waters of the Bay of Bengal and the Arabian Sea to have had northward outlets through the heart of the Euro-Asiatic continent, penetrating in two or more directions into the then much more extensive Arctic Ocean, we should have an agency at work which would render the presence of any permanent ice in the North Polar area as impossible as it is now in Scotland. The cooling agency of ice being once abolished, the comparatively small area of the Polar as compared with the Tropical seas (about one-tenth) would facilitate the raising of the temperature of the former to perhaps 15° or 20° F. above the freezing point, and this would not only give the Arctic lowlands a climate quite sufficient for the vegetation which we know they supported, but, by doing away with the only source of our winter cold, would give our islands a perfect immunity from frosts and render them capable of supporting the vegetation now characteristic of sub-tropical lands.

That the modifications of land and sea here indicated *did* exist throughout a considerable portion of past geological ages, and that the existing consolidation of the great northern continents, to which the possibility of our present Arctic climates is mainly due, is a comparatively recent and abnormal phenomenon, I have endeavoured to prove in the work already referred to. At present I have only undertaken to show, that a "suggested" rearrangement of land and water adequate to raise the temperature of Western Europe to a very sensible, or even to a very large extent, *is* "possible." ALFRED R. WALLACE

Photophonic Music

I HAVE not yet met with any reference to the capabilities of the photophone for giving musical harmonies. Might not some curious effects be got in some such way as this:—Suppose a disk perforated with holes in four concentric circles corresponding to the notes of a chord; a beam of light to be sent through each circle to a lens and disk of rubber with tube (as Prof. Bell has described), the four tubes debouching in a cup-shaped cavity to be applied to the ear; lastly, the disk to be rotated variably by means of a small windmill or otherwise. Another arrangement might be to make the beams of light pass through the holes to selenium cells in four telephone circuits, the four telephones being placed in one frame, against which the listener's ear would be put, or coupled in pairs, one pair put to either ear. Again, might not harmonised tunes be obtained thus:—Suppose a broad open drum of wood or cardboard rotated uniformly on a screw forming a vertical axis. The drum is perforated in a spiral band of four lines of holes (for the light), corresponding to the notes of the harmonised air to be produced. This spiral band passes before four rubber disks or selenium cells (as in the former system), but arranged vertically and placed within the drum, at the lower part. The drum, it will be understood, works gradually down the axis, presenting a continuous four-line series of holes before the receiving apparatus. Again, a long continuous strip of cardboard, with four rows of holes, might be passed before the receiver in any convenient way. M.

The "Philosophy of Language"

THOUGH it is my principle never to answer any criticism of my writings, I find myself obliged to deviate for once from this rule by the character of your highly esteemed review, and by the desire to find a discerning appreciation from your readers, whose judgment has for me the greater value, as it is the main aim of all my works to restore the relations between the science of mind and natural philosophy. Therefore you would oblige me very much by publishing the following short remarks:—

The critic of my *brochure* ("Max Müller and the Philosophy of Language,") says, ". . . Nor is speech the deliberate product of a conscious will." Now it is the real aim of all my works on the philosophy of language to show how the human will—before dark and unconscious—grows to consciousness *by language* and human activity intimately connected with it. Can there be the least doubt of this, even if I refer only to the motto of my "Origin of Language,"—"Language has created reason, before language man was without reason"?

Your critic has made me say *just the contrary of what I really have said.* Besides, it would have been only fair if the critic had pointed to the following little passage of my *brochure*:—

"Max Müller has since expressed *his full assent* to this view," (viz., my theory of the origin of language).

Mayence, November 11 LUDWIG NOIRÉ

[I gladly accept the author's assurance that he adheres to the view that "language has created reason." At the same time his

express words as well as the general bent of his argument seemed to point in the opposite direction. Thus at p. 81 he writes :—"Language is a product of *association*. . . . Language is a product of an active, not of a passive, process; it is the child of *will*, not of sensation." The statement that language is "the child of will" seems to me practically identical with the assertion that "speech is the deliberate product of a conscious will," because the will here spoken of, being "an active process," is necessarily conscious.—A. H. KEANE.]

Notes on the Mode of Flight of the Albatross

WHEN watching the albatross one is struck with the fact that the bird gets up to windward without appearing to use his wings to a degree sufficient to account for the same. The sailors are satisfied with the explanation that he beats to windward. The conditions are of course not analogous to those of a ship sailing to windward. If the wind be very light, or if there be a calm, occasional powerful and obvious flapping of the wings occurs. If there is no wind, the birds often settle on the water round the ship. In very heavy weather the birds disappear altogether, probably settling on the water. Except that for breeding they resort to the islands, I believe they frequent the open ocean, where the surface is seldom without more or less swell.

On watching the flight of the albatross, one observes that in order to rise from the water violent and obvious flapping of the wings is necessary, which is continued some time after the wings cease to strike the water. After a start has thus been effected, if there is a fresh breeze, the wings are kept almost motionless. Sometimes the bird goes some distance with the impetus derived from the flapping of the wings at the start, but sooner or later he turns so as to expose the plane surface of his wings full to the force of the wind, rising at the same time some height above the water, and drifts off to leeward, thus soon acquiring the velocity of the wind; then swooping down into the hollow between two swells, he turns his head to windward, and keeping close to the surface of the water, sails along more or less against the wind for a surprising distance; finally, rising over the crest of a wave comparatively high into the air, and turning with his wings as before, so as to catch the wind to the fullest extent, he again lets himself drift off to leeward.

Thus the manœuvre he performs seems to consist in drifting with the wind in such a way as to attain its velocity very soon, and then turning round so as to make use of this velocity to carry him in the contrary direction.

Of course if he still remained exposed to the wind which had imparted to him its velocity he would not travel far against it before he came to a standstill, and he would certainly make no progress to windward; but by keeping close to the surface of the water, and as much as possible in the hollows between the waves, he is almost out of the wind; and in this comparatively calm region the impetus derived from the wind will carry him a long distance in exactly the opposite direction to that of the wind itself.

This manœuvre appears to be an important factor. No doubt the almost imperceptible movement of the wings may assist, though that this alone is insufficient to account for the progress to windward appears evident from the powerful efforts made with the wings in rising from the water and in calm weather. I have never had an opportunity to observe the albatross flying over land or over level water. If the manœuvre above described be an important factor, the birds then would have to use their wings much as they do in very light winds on the ocean. If very strong winds were blowing, they would have to settle on the land or in the water in order to remain at the locality.

ARTHUR W. BATEMAN

A General Theorem in Kinematics

PROF. EVERETT (*ante*, p. 99) has overlooked in the introductory paragraphs of Prof. Schell's paper, to which he refers for the original statement of the theorem re-discovered by Prof. Minchin, the acknowledgment: "Der Mittelpunkt der Beschleunigungen und jene beiden Kreise wurden bereits 1853 von BRESSE gefunden." The reference is to the *Journal de l'École Polytechnique*, tom. xx., "Mémoire sur un Théorème nouveau concernant les Mouvements Plans, etc." By means of the "two circles" Bresse determines the point c (J) "qui aura une accélération totale nulle" (p. 82), and then by very ingenious application of kinematic principles deduces those relations to it which any arbitrary point (P) has, as given by Prof. Minchin. Bresse names c "second centre instantané de rotation."

University Hall, December 4 J. J. WALKER

Geometrical Optics

YOUR correspondent "P. C." (NATURE, vol. xxii. p. 607) asks information concerning a work, in English or French, on geometrical optics, thoroughly explaining the optical construction of telescopes and microscopes. I am not aware of any such publication these last forty years, but deem it possible that it may interest your correspondent to know of the existence of such a work in German by von Littrow, entitled "Dioptrik, oder Anleitung zur Verfertigung der Fernröhre." It was published, I believe, in Vienna about 1838. W. G. LOGEMAN

High Burghal School, Haarlem, Holland, November 17

[Littrow's "Dioptrik" was published at Vienna in 1830 in 8vo.—ED.]

Ozone

IF a slip of the prepared paper, used for testing for atmospheric ozone, be carefully moistened on one side with alcohol, using a clean camel-hair brush, on burning off the spirit and immersing the slip of paper in water the paper changes to a deep purple colour, as deep as No. 8 in Negretti and Zambra's scale of colours for ozone.

Is this due to the development of ozone? as, according to Schönbein, heat destroys ozone. J. P.

Leicester, December 5

PLANTS OF MADAGASCAR

DURING the present year no less than four separate collections of plants have been received at Kew from Madagascar, including in the aggregate about a thousand species, represented by specimens complete enough to be botanically determinable. As the hills of the interior of the island attain an elevation of 10,000 feet, its range of climate is considerable. We now know not less than two thousand Madagascar flowering-plants, and probably have almost exhausted its ferns, to which the collectors have paid special attention, and which are about 250 in number, so that we may consider ourselves in a position to draw broad general conclusions as to the botany of the island.

Amongst the tropical types there are a considerable number of endemic genera. The lemurs find their parallel in the vegetable kingdom in the *Chlænaceæ*, a natural order whose nearest affinities are with *Tiliaceæ*, *Dipterocarpeæ*, and *Ternstromiaceæ*, which is strictly confined to Madagascar, and comprises four genera and about twice as many species, to which the Rev. R. Baron, in these new collections, has added a well-marked novelty in a second species of *Leptolæna*. Altogether there are certainly not less than fifty genera confined to the island, some of them very curious types, as *Dicoryphia* in *Hamamelideæ*, *Ouvirandra* in *Naiadaceæ*, *Asteropeia* (placed in the "Genera Plantarum" in *Samydaceæ*, but which Mr. Baron's excellent new specimens will most likely have to be removed to *Linaceæ*), *Macarisia* in *Rhizophoreæ*, *Deidamia* and *Physena* in *Passifloreæ*, *Hydrotriche* in *Scrophulariaceæ*, *Canetia*, *Tánnodia* and *Sphærostylis* in *Euphorbiaceæ*, *Pachnotrophe* in *Moreæ*, *Calantica* in *Samydaceæ*, and several each in the orders *Rubiaceæ*, *Melastomaceæ*, and *Compositæ*. To these endemic types the new collections add at last three, *Kitchingia*, a fine new genus of *Crassulaceæ* allied to *Bryophyllum*, with five or six species named after the collector of the first of the four parcels, *Rhodocodon*, a monotypic genus of gamophyllous *Liliaceæ* allied to *Hyacinthus*, and *Micronychia*, in *Anacardiaceæ*, also monotypic, figured lately in Hooker's Icones. Besides these the tropical flora of the island contains a large proportion: first, of endemic species of genera known elsewhere; second, of species